

# GUÁNICA BAY WATERSHED UPDATE

## NOAA hosts Guánica/USVI Meeting

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### Submission Guidance

The Guánica Bay Watershed Update is issued bi-monthly. Please send any notices that you would like to share with the group to Patricia Bradley ([bradley.patricia@epa.gov](mailto:bradley.patricia@epa.gov)).

Please send photos that support your story and include a caption for each photo.

On February 24th 2012, the National Oceanic and Atmospheric Administration's Coral Reef Conservation Program hosted an all-day meeting in Silver Spring, Maryland for project managers in Puerto Rico and the U.S. Virgin Islands to give jurisdictional partners updates on current watershed management efforts. Over 40 representatives from federal agencies, nonprofit organizations, academia, and the jurisdictions attended the meeting.



View south from Guánica Bay. Photo courtesy of Tom Moore, NOAA's Restoration Center.

Topics ranged from watershed management planning and implementation of best management practices to monitoring sediments, nutrients, and chemical contaminants. This all day meeting served as an excellent venue for sharing information across both jurisdictions. One of the many outcomes from this meeting was a request to hold semi-annual conferences to foster the exchange of information, lessons learned, and technical skills between the two jurisdictions to more effectively address the impacts of land-based sources of pollution on coral reef ecosystems.

The Coral Reef Conservation Program has extended appreciation to NRCS, EPA, USFWS, PR DNER, USVI DPNR, UVI, TNC, Coral Bay Community Council, the St. Croix Environmental Association, the Horsley Witten Group, Ridges to Reef, Inc., Protectores de Cuencas, Inc., and GLM Engineering COOP for contributing to such a successful meeting.

For more information, contact Rob Ferguson, [rob.ferguson@noaa.gov](mailto:rob.ferguson@noaa.gov)

## EPA studies distribution of terrestrial sediment in coastal zone



**Figure 1.** Sediment discharging into Guánica Bay from Rio Loco. Sediment discharge is highly variable, but quite heavy after major rainfall events. Sediment is often accompanied by nutrients and toxic contaminants. (Photo NOAA)

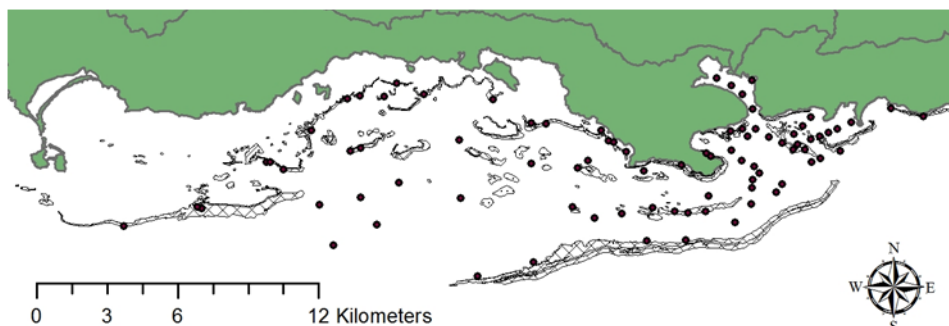
Fundamental to the inter-Agency effort to protect coral reefs in southwestern Puerto Rico is the assumption that soil eroded from land in the Guánica/Rio Loco watershed is carried out of Guánica Bay and into coral reef zones and may even be pushed by currents to the west, where it could affect coral reef communities near La Parguera and beyond. Terrestrial soil particles, with their associated contaminants and nutrients, can stress corals and negatively impact reef health. At least some of this assumption is true. There is strong evidence that eroded soil is being discharged into Guánica Bay (Fig. 1), even to the point of changing the Bay's bathymetry. There is also evidence that at least some of that eroded soil is carried out of the Bay into the coastal zone, although how much is not well known and is currently under

investigation by UPR-Mayaguez scientists. It is not known where the soil ends up. Does it settle on reefs outside of Guánica Bay, is it carried to La Parguera reefs, or does it simply drift out to sea?

One way to answer this question is to analyze sediment samples from the coastal zone to determine how much of it comes from land. During a recent coral reef survey in southwestern Puerto Rico, EPA research divers collected sediment samples from 86 stations along the coastal shelf (Figs. 2 and 3). The samples were returned to EPA's laboratory in Gulf Breeze, Florida to quantify the percentage of sediment from each sample originating from land.



**Figure 2.** EPA diver Danny Rodriguez sampling at coral reefs along the coast of South West Puerto



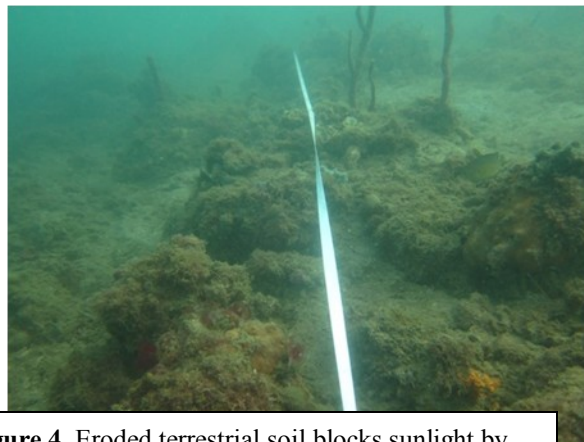
**Figure 3.** Sampling stations (86) where sediment samples were scraped from the top surface of the sea floor. Samples were collected to try to determine where sediment discharged from Guánica Bay may eventually settle.

The analysis is fairly straight-forward: When sediment is exposed to acid or burned at high temperatures, carbonate sand particles from marine origin are digested but terrestrial particles (without carbonate) are not. So the percent of sediment from land sources can be determined by measuring the sediment weight before and after carbonate is removed (digested). Plotting on a map the different percentages for stations across the sampling area will leave a track of terrestrial sediment deposition.

Why is this of interest? High deposition of terrestrial soil in reef sediments would be a bad sign for coral ecosystems. Not only would it indicate high amounts of soil in the runoff, but also that soil particles are probably settling on coral colonies (Fig. 4). Particles on coral colonies or even in the water column block sunlight needed for photosynthesis and coral growth. Particles from land may additionally expose corals to adsorbed contaminants and nutrients from roadways, agricultural fields and housing developments in the watershed. So corals have to remove the particles, which they readily do through heavy mucus production—mucus flows off the colony carrying the particles along. But mucus production occurs with an expense of energy that could have otherwise been used for growth and reproduction.

Low deposition of terrestrial soil in reef zones could indicate less discharge from the Bay—but not necessarily. Even with a high Bay discharge, strong water currents could carry away the soil particles before they settle. This would be particularly true if the soil particles were fine-grained. It does at least mean less exposure to coral reefs. Corals would still be affected by higher turbidity in the water column, especially after rain events, but there would be less direct contact with the corals and less chance of repeated exposure through resuspension of the sediments.

When completed, the results from the study can be used to compare with coral reef condition measured by EPA during 2010 and 2011 assessment surveys. This will aid in understanding some of the effects of watershed runoff on coral reefs. Further analysis of the samples is planned, including an attempt to identify markers that could distinguish whether the terrestrial component originated from mountain ridges, river beds or agricultural fields. In ongoing laboratory studies, EPA is trying to determine exactly what effects sediment collected from outside Guánica Bay may have on coral growth and recruitment. High sediment loads may affect recruitment by blocking sites for settling or masking chemical cues that signal coral planulae to metamorphose and settle. This may be a reason that many of the reefs outside of Guánica Bay are becoming covered with *Palythoa* (Fig. 5), a zooanthid that may be able to outcompete corals in high sediment, high nutrient conditions.



**Figure 4.** Eroded terrestrial soil blocks sunlight by creating turbidity in the water column and settling on coral heads. Coral colonies in this picture have been completely covered by sediment and algae are beginning to grow on their surfaces. Only a few rod-shaped sponges are surviving at this station.



**Figure 5.** Zooanthids such as this *Palythoa* may outcompete corals in high sediment, high nutrient conditions found outside Guánica Bay.

## EPA Initiates Website to Mark 40 Years of the Clean Water Act

2012 is the 40th anniversary of the Clean Water Act, the nation's principal law for protecting our most irreplaceable resource—clean water.

Clean water is vital for our health, communities, environment and economy. Forty years ago, the American people faced almost unimaginable health and environmental threats in their rivers, streams, lakes, wetlands and coastal waters.

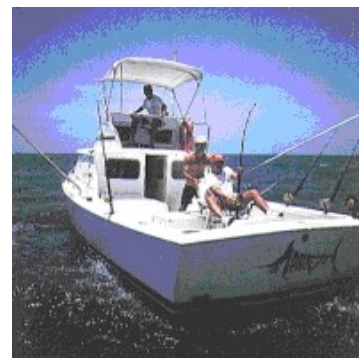


Layers of industrial pollution on Cleveland's Cuyahoga River caught fire and Lake Erie was declared dead. An oil spill fouled hundreds of square miles of water off the coast of California, while in Washington, D.C., the Potomac was coated with so much sewage the pollution could be smelled in the city on hot days.

These circumstances prompted Congress to come together and set a new national goal "to restore and maintain the chemical, physical, and biological integrity of the Nation's waters". Passage of the bill led to unprecedented efforts to clean up U.S. waters in an effort to render them fishable and swimmable.

The Clean Water Act embodied a new federal-state partnership, where federal guidelines, objectives and limits were to be set under the authority of the U.S. Environmental Protection Agency, while states, territories and authorized tribes would largely administer and enforce the CWA programs, with significant federal technical and financial assistance. The Act also gave citizens a strong role to play in protecting and restoring waters. The federal-state partnership has produced substantial reductions in the discharge of pollutants from point sources and yielded significant improvements in water quality throughout the country. These water quality improvements allowed recovery of aquatic ecosystems and greater public use of the resources.

EPA has set up a webpage –Water is Worth It - as the central location for information, activities, news and networking at: <http://water.gov/action/cleanwater40c/>. The website provides links to a variety of other websites including important landmark moments for America's water during the last 40 years, a gallery of photographs from 1972 and 2012, and resources and activities for students in grades K-12. There is also an archive of webinars on various aspects of the Clean Water Act, and an opportunity to join the Twitter conversation of clean water at <http://twitter.com/#search?q=%23cleanwater%20from%3AEPWater>, and the Facebook page: <https://www.facebook.com/EPAWaterIsWorthIt>.



## Sun to Shade coffee initiative update

The sun to shade coffee initiative in the upper Guánica Bay watershed continues apace. Tree deliveries and practice certifications for farms enrolled in the program since 2010 continue with a total of 16,991 tree seedlings delivered to farmers from 2010 through the present, and another 4,423 expected to be delivered and planted by the end of 2012 for a total of 21,414 seedlings. One of these farms pre-dated the initiative for the Guánica Bay watershed, but is included in these numbers because it lies within the upper watershed. The other farms are being served through the combined efforts of the Fish and Wildlife Service (FWS) to supply the tree seedlings and technical assistance with their cooperator, Envirosurvey, Inc., and the USDA, Natural Resource Conservation Service in providing cost-share incentives to the farmer to plant the trees following the shade coffee model. Approximately 396 acres have been certified as planted with shade trees to date, and a total of 606 acres are expected by year end. Additional farms and acreage will be added in fiscal year 2012. The farms are under several years of contract with NRCS through 2014 for additional trees and acreage, and FWS and NRCS hope to target additional farms for future years.



**Figure 1.** Shade tree planting certification by FWS and Envirosurvey, Inc.



**Figure 2.** One of several native shade tree deliveries, spring 2012.

Additionally, FWS has been participating in workshops with NGOs, other agencies, and farmers to adapt existing shade coffee certification criteria to the farms and conditions in Puerto Rico. The expectation is that these NGOs and farmers will develop a certification process to allow marketing of shade grown/ecologically sensitive coffee from that region. FWS is also participating in workshops developed by the revitalized Puerto Rico Agricultural Conservation Districts, with a concentration on the Guánica Bay Watershed. The first such meeting, held April 26, was very well attended by local farmers in the upper watershed.

## NOAA Invites Comment on Coral Status Review Report and Draft Management Report

As part of the ongoing process to evaluate 82 species of coral from the Caribbean and Pacific for listing under the Endangered Species Act (ESA), NOAA is inviting public review of two reports, a scientific Status Review Report and a draft Management Report. The review of these 82 species of corals has been the most complex ESA listing process NOAA Fisheries has ever undertaken. NOAA will use the additional input to ensure that the best scientific information available will be considered as they develop their 12-month finding. Please note that releasing these documents is not a part of the normal rulemaking process – it is an engagement process that provides transparency and openness in decision making. Should NOAA Fisheries determine that a listing is warranted, it will be published as a proposed rule in December 2012 for additional public comment.



*Dendrogyra cylindrus* (Pillar coral)

The Status Review Report includes a determination of the risk of extinction for each of the 82 candidate coral species out to the year 2100 based on an evaluation of the best available information and data including the following topics: (1) long-term trends in abundance throughout the species' ranges; (2) potential factors for any declines of the species throughout their ranges (human population and consumption, climate change, ocean acidification, overharvesting, natural predation, disease, habitat loss, etc.); (3) historical and current range, distribution, and habitat use of the species; (4) historical and current estimates of the species' population sizes and available habitats; and (5) knowledge of various life history parameters (size/age at maturity, fecundity, length of larval stage, larval dispersal dynamics, etc.). In evaluating the risks of extinction, the Biological Review Team did not make any assumptions about future policy changes or technological advances that could potentially alter the projections used in this analysis.

The Draft Management Review covers existing regulatory mechanisms including international treaties, laws, decrees, executive orders, rules and/or regulations enacted and being implemented by some governing body or official, whether they are international organizations, national governments, state and local authorities, heads-of-state, or other so empowered official, affecting the status of the 82 coral species. It also covers conservation efforts include actions, activities, and programs undertaken by both governmental and non-governmental organizations ("NGOs," e.g., conservation groups, private companies, academia, etc.) that may eliminate or reduce threats or otherwise improve the status of the 82 coral species identified by the Status Review Report.

Status Review Report of 82 Candidate Coral Species (pdf) – Note: This file is 35MB.

[http://www.nmfs.noaa.gov/stories/2012/04/docs/full%20doc\\_corals\\_status%20review%20report.pdf](http://www.nmfs.noaa.gov/stories/2012/04/docs/full%20doc_corals_status%20review%20report.pdf)

Draft Management Report (pdf) – Note: This file is 2.3 MB.

[http://www.nmfs.noaa.gov/stories/2012/04/docs/full%20doc\\_corals\\_draft%20management%20report.pdf](http://www.nmfs.noaa.gov/stories/2012/04/docs/full%20doc_corals_draft%20management%20report.pdf)

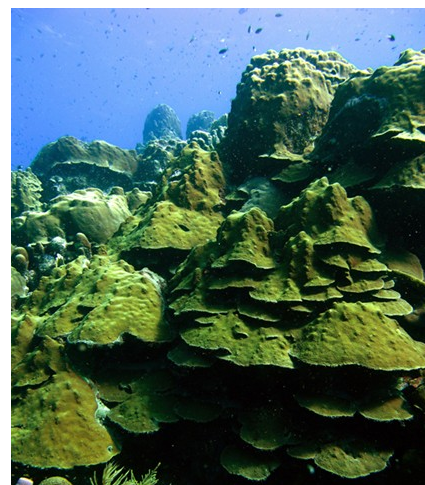
Why is this important to the Guánica Bay Watershed? Eight of these species are found in the western Atlantic/Caribbean - *Agaricia lamarcki*, *Dendrogyra cylindrus*, *Dichocoenia stokesi*, *Montastraea annularis*, *Montastraea faveolata*, *Montastraea franksi*, *Mycetophyllia ferox*, and *Oculina varicosa*. If you are aware of any relevant scientific information collected or produced since the completion of the Status Review Report in 2011, or any relevant scientific information not included in the Report, or relevant management information not included in the draft Management Report you should consider submitting this information during the comment period.



*Dichocoenia stokesi* (Elliptical star coral)

**\*Important Dates\***

The public review process began on April 13, 2012, and ends on July 31, 2012. Instructions on how to submit comments and/or information is listed below.



*Montastraea faveolata* (Mountainous star coral)

You may submit comments on the Status Review Report and the draft Management Report and/or additional papers, reports, and information by any of the following methods. If possible, comments should be grouped according to the heading of the relevant section of the reports.

- Electronic Submission— submit all electronic information via electronic mail to:

NMFS.82Corals@noaa.gov

- Mail—submit written comments to:

Regulatory Branch Chief

Protected Resources Division

Attn: 82 coral species

National Marine Fisheries Service

Pacific Islands Regional Office

1601 Kapiolani Blvd., Suite 1110

Honolulu, HI 96814

- or -

Assistant Regional Administrator for Protected Resources

Attn: 82 coral species

National Marine Fisheries Service

Southeast Regional Office

263 13th Avenue South

St. Petersburg, FL 33701

- Fax—808-973-2941; Attn: Protected Resources Regulatory Branch Chief,  
or 727-824-5309; Attn: Assistant Regional Administrator for Protected Resources

## 21st Anniversary: American Wetlands Month

May marks the 21st anniversary of American Wetlands Month, a time when EPA and its wetland partners across the country celebrate the vital importance of wetlands to our nation's ecological, economic, and social health.

What are wetlands? Generally, wetlands are lands where saturation with water is the dominant factor determining the nature of soil development and the types of plant and animal communities living in the soil and on its surface. Wetlands vary widely because of regional and local differences in soils, topography, climate, hydrology, water chemistry, vegetation, and other factors, including human disturbance. Wetlands provide habitat, food, and protection to many different species of animals including fish, birds, mammals, reptiles, and invertebrates, including endangered and commercially important species of fish, shrimp, crabs, and shellfish. Wetlands also deliver a wide range of valuable ecosystem services that contribute to human well-being. They provide safe water supply, fish and fiber, wildlife habitat, flood regulation and recreation, among many other benefits.

Puerto Rico is home to diverse wetland habitats, including interior rain forest wetlands, coastal mangrove swamps, freshwater swamps, brackish and freshwater herbaceous wetlands and hypersaline salt flats. Of particular importance to the Guánica Bay watershed are the saltwater wetlands found along the coast – seagrass beds and mangrove wetlands.

Seagrass beds are generally found in the shallow nearshore coastal environment, and may occasionally be exposed to the air during very low tides. Seagrasses are grass-like flowering plants that live completely submerged in marine and estuarine waters. In Puerto Rico, seagrass beds are generally associated with mangrove wetlands and coral reefs.

Mangroves are trees and shrubs that inhabit the shallow nearshore tropical and subtropical coastal environment along protected coastlines, including cays, away from the direct action of waves. Mangrove wetlands may also include other associated vegetation including trees, herbs, and ferns. Mangrove trees have developed special adaptations to survive the variable flooding and salinity conditions imposed by the coastal environment.

EPA activities planned for the month of May include educational displays, discussions, presentations, special feature articles, wetland walks and celebrations, and an array of other outreach and communication events. Information will be posted throughout the month at: <http://www.epa.gov/owow/wetlands/awm/>

Contact Kathleen Kutschenreuter (202) 566-1383 for more information.



# ReefLink Database:

## A Decision Support Tool for Linking Coral Reefs and Society through Systems Thinking

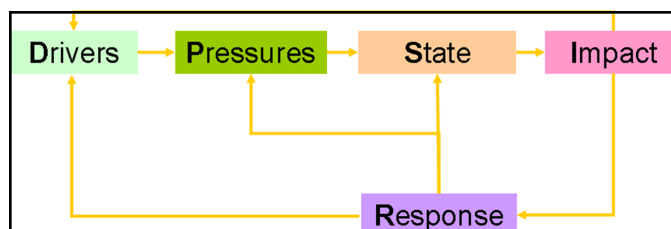
Coral reefs provide the ecological foundation for productive and diverse fish and invertebrate communities that support multibillion dollar reef fishing and tourism industries. Yet reefs are threatened by growing coastal development, climate change, and over-exploitation. A key issue is that scientific and management efforts are often narrowly defined. As a consequence, there is often difficulty in predicting the indirect consequences and benefits of decisions. There is an urgent need for a decision framework which integrates environmental concerns with social and economic needs.



[www.epa.gov/ged/coralreef](http://www.epa.gov/ged/coralreef)

EPA scientists have developed the ReefLink Database utilizing a systems approach to integrate ecosystem services into the decision process, including elucidating the linkages between decisions, human activities, and provisioning of reef ecosystem goods and services. This scientific and management information database employs the Driver-Pressure-State-Impact-Response (DPSIR) systems thinking framework to describe the linkages between decisions, human activities, and provisioning of reef ecosystem goods and services. This database provides a navigable hierarchy of related topics and information for each topic including concept maps, scientific citations, management options, and laws.

The database can be used by 1) the public to learn how their community may affect or benefit from coral reefs, 2) scientists to identify decision scenarios for which their research may be relevant, and 3) reef managers to understand how systems thinking can aid in identifying alternative management options. Although specifically designed for coral reefs, the database provides an example of using a systems thinking framework to integrate scientific research with decision-making, and in concert with a systems thinking tutorial ([www.epa.gov/ged/tutorial](http://www.epa.gov/ged/tutorial)), presents approaches which are broadly applicable to any environmental management problem.



## Conservation practices applicable to the management of the Río Loco watershed: A workshop for decision makers

Sea Grant Puerto Rico through the Río Loco Watershed Conservation Buffers (NFWF grant) project sponsored a workshop for decision makers concerning the conservation practices applicable to the management on the Río Loco watershed on March 2012. The purpose of the workshop was to improve decision making and management in the areas by providing information on conservation practices in the farmlands and the current initiatives and projects in the Río Loco and Guánica Bay watershed. Twenty-three people attended the workshop, including representatives from the Puerto Rico Planning Board, the Municipality of Guánica, the Department of Natural and Environmental Resources, US Fish and Wildlife, USDA Natural Resources Conservation Service, NOAA Fisheries, US Environmental Protection Agency, academics, private consultants, and non-governmental organizations from the watershed.



Photo by Efraín O. Figueroa- Sea Grant

The agenda for the workshop included the following presentations:

- *Río Loco watershed and Guánica Bay conservation project*- NRCS
- *Río Loco watershed conservation and restoration initiatives project*- Protectores de Cuencas Inc. (NGO)
- *Conservation practices applicable to the Río Loco watershed management*- NRCS
- *Storm water management applicable to the Río Loco watershed*- EPA
- *Soil Bio-engineering for stream bank restoration at Río Loco*-NRCS
- *Development of the storm water management program for the municipality of Guánica*- Municipality of Guánica
- *Río Loco watershed conservation buffers*- Sea Grant UPR
- *Shade coffee initiative*- USFWS
- *Corals and trees: An integrated vision for the watershed*- CafíEsencia (NGO)
- *Río Loco and Guánica Bay watershed conservation initiatives*- Southwest Conservation District (NGO)

The workshop was very successful. Workshop evaluations revealed that 100% of the participants reported satisfaction with the content and scientific understanding of the activity. They also indicated their intention to apply science-based knowledge, awareness of collaboration with the initiatives, and the integration of diverse perspectives in their working areas.

For addition information, contact Lillian Ramírez-Durand, [Lillian.ramirez@upr.edu](mailto:Lillian.ramirez@upr.edu)

## Partnership Promotes Environmentally Sustainable Practices in the Tourism Industry

The U.S. Environmental Protection Agency (EPA) recently entered into a first of its kind agreement with the Puerto Rico Tourism Company and the Puerto Rico Solid Waste Authority to promote environmentally sustainable practices in the tourism industry. The memorandum of understanding lays out the framework for the three agencies to encourage companies in the tourism and hospitality industries to implement green practices and to recognize participating companies by including them in an online directory of facilities that employ green practices.

Under the memorandum of understanding with EPA, the Puerto Rico Tourism Company and Puerto Rico Solid Waste Management Authority have agreed to:

- Encourage solid waste reduction, reuse and recycling for hospitality facilities. This includes advocating that facilities use reusable dishes, silverware and glassware; buy supplies in bulk to reduce packaging and use refillable soap and shampoo dispensers; donate unused non-perishable and unspoiled perishable food to non-profit organizations such as local food banks, soup kitchens, pantries and shelters; and promote the use of nontoxic cleaning products.
- Recommend that facilities use clean vehicles in their fleets and promote the use of clean vehicle fleets by supply chain industries associated with hospitality.
- Recommend green building design, construction, operation, maintenance, renovation and deconstruction in hospitality facilities.
- Encourage owners and operators of tourism-related facilities to measure and track the energy performance of facilities, and develop and implement plans to achieve energy savings, including use of EPA's EnergyStar energy conservation tools.
- Promote water-efficient practices and products.
- Protect and use existing vegetation where possible, use vegetation and other landscape elements that promote regional identity, and use vegetation and other landscape strategies to lower energy consumption.

The Puerto Rico Tourism Company will recognize the companies that choose to participate by developing and maintaining an online directory of hospitality facilities in Puerto Rico that are engaged in sustainable practices. This information will be widely available to potential tourists on the Puerto Rico Tourism Company's website. The goal of today's agreement is to get at least 10 percent of the tourism and hospitality facilities engaged in green within one year.

Information on making hospitality facilities more sustainable can be found at <http://www.epa.gov/region02/p2/hospitality/index.html>. For more information, contact: John Martin, [martin.johnj@epa.gov](mailto:martin.johnj@epa.gov), or Brenda Reyes, [reyes.brenda@epa.gov](mailto:reyes.brenda@epa.gov)



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# Puerto Rico Coral Reef Local Action Strategies

Local Action Strategies (LAS) are a U.S. Coral Reef Task Force led initiative to identify and implement priority actions needed to reduce key threats to valuable coral reef resources in each U.S. coral reef jurisdiction. Puerto Rico recently developed a LAS for 2011-2015. A working team, composed by the Coordinator, Ms. Damaris Delgado, the DNER Point of Contact for the NOAA's Coral Reef Conservation Program (CRCP) and Ms. Antares Ramos, the NOAA Coral Management Liaison in Puerto Rico was formed to facilitate the process of developing the LAS. Four priority areas were selected for LAS application: Culebra, the North-East reserves, Cabo Rojo, and Guánica and its marine extensions.

The strategy for producing the 2011 LAS was to conduct a two-day LAS workshop in each of the priority areas. A diverse group of stakeholders from different government agencies, scientists, teachers, community organizations, service providers, marine protected areas managers, fishermen, business representatives, students, were invited to participate and contribute in the formulation of the LAS.

The Guánica LAS workshop participants identified the following issues as areas of concern for the coral reefs in the Guánica priority area:

- Presence of visitors beyond carrying capacity /limit of acceptable change in the area
- Need for Best management practices (BMPs) in agricultural activities to prevent runoff
- Inefficiently used water treatment systems
- Training and education needs of enforcement personnel
- Extension of the priority area to the East, to include Guayanilla Bay, and to the West to include the reefs in La Parguera, Lajas.



Local Action Strategies (LAS)  
for Coral Reef Conservation  
2011-2015



PUERTO RICO



Workshop Participants identified 21 projects for the Guánica watershed.

The workshop participants identified a total of 21 projects for the Guánica watershed:

1. Audit operations of waste water treatment plants in Guánica and the entire watershed.
2. Establish the correlation between discharge from waste water treatment plants and the degradation of adjacent coral reefs.
3. Carry out a survey about the sedimentation pattern in the watershed.
4. Monitoring seagrass beds conditions to evaluate water quality.
5. Identify, upgrade and improve current sewage disposal system.
6. Identification and document of Combined Sewer Overflows (CSOs).
7. Separate runoff from wastewater discharges.
8. System monitoring to assess restoration.
9. Development of a Web-based mapping interface for the allocation and report of coral bleaching sites along the Puerto Rico coast.
10. Pollutant transport reduction through social marketing and local action
11. Establish certification program for Erosion and Sedimentation Control professionals.
12. Create a Guánica Reserve Website
13. Enable joint enforcement agreement
14. Outreach to include marine resources (coral reef, fisheries, etc.) beyond endangered species.
15. Creation of Citizen Advisory Council (CAC) or Pollutant Advisory Committee (PAC)
16. Restoration of Guánica Lagoon - (CRTF Ongoing efforts).
17. Identify areas of high diversity and live coral coverage for additional protection and expand existing protected areas to include these areas. Close areas when bleaching and disease or hurricane damages are extensive to allow for the recovery of reef areas.
18. Capacity building of DNER Rangers.
19. Provide DNER rangers adequate equipment to undertake enforcement actions and improve results of interventions.
20. Using the results from the sedimentation patterns in the watershed, revise the existing land use regulation (POT, Special Plans).
21. Detect and eliminate illicit discharges and combined sewers.

The issues of concern on the status of the coral reefs presented by the participants in the LAS workshops closely followed the technical reports on the status of the coral reef ecosystems presented by scientists and experts in the field, reflecting that there is an awareness of the coral reef conditions among the stakeholders.

The LAS Report is available in PDF format at: <http://coralreef.noaa.gov/aboutcrp/resources/pdfs/lasreport2012.pdf>



## EPA Region 2 Announces Wetlands Development Grants

EPA Region 2 has announced a request for proposals for Wetland Program Development Grants (WPDGs). WPDGs provide eligible applicants an opportunity to conduct and promote the coordination and acceleration of research, investigations, experiments, training, demonstrations, surveys, and studies relating to the causes, effects, extent, prevention, reduction, and elimination of water pollution. Implementation of wetland protection programs is not an eligible project under this announcement. States, Tribes, local government agencies, interstate agencies, intertribal consortia and universities that are agencies of State government are eligible to apply under this announcement. Non-profit organizations are not eligible to compete under this RFP.

Projects must occur within the states of EPA Region 2, specifically the Commonwealth of Puerto Rico, New Jersey, New York and the US Virgin Islands.

All proposals submitted under this RFP must be for projects that build or refine state/tribal/local government wetland programs in reference to EPA's Core Elements of an Effective State and Tribal Wetlands Program Framework described at [http://water.epa.gov/grants\\_funding/wetlands/cefintro.cfm](http://water.epa.gov/grants_funding/wetlands/cefintro.cfm)

EPA anticipates approximately \$1,702,000 in federal funding to be available for assistance agreements under this announcement. Awards will likely range from \$150,000 to \$500,000 in federal funding in approximately 5 to 8 awards. Non-federal matching funds of at least 25% of the total project cost (total federal share and match) of the project are required in accordance with 40 CFR 31.24, 35.385, and 35.615. The match must be for an allowable cost and may be provided by the applicant or an eligible partner organization or institution. The match may be provided in cash or by in-kind contributions and other non-cash support.

Wetland Program Development Grants are competitive. Applicants must submit a proposal, to include a work plan and budget. An EPA panel will review eligible proposals based on the evaluation criteria listed in the announcement with final funding decisions made by the Region 2 Selection Official.

### Important Dates:

**6/8/12** Proposals must be received electronically through Grants.gov by **11:59 P.M. EST** or in hard copy by **5:00 p.m. EST**.

**7/13/12** EPA tentatively selects proposals for awards. Successful applicants will be requested to submit full grant applications and workplans for selected projects to be funded.

**9/30/12** EPA awards grants to recipients.

The dates above (other than the **6/8/12** proposal submission date) are anticipated dates and may be subject to change.

Additional information can be obtained at: <http://www.epa.gov/region2/water/wetlands/grants.htm>

## NOAA Event Increases Awareness of Coral Reef Ecosystem Research and Conservation

NOAA's Coral Reef Conservation Program successfully concluded a series of unique community outreach activities in Puerto Rico called "Reef Smart"—A Coral Reef Ecosystem Education Initiative. The 2012 *Nancy Foster* Mapping Mission to map Puerto Rico's coral reef ecosystems and fish habitats served as a platform for hosting a series of unique events designed to engage students, teachers, managers, partners, stakeholders and policy makers to increase the awareness of NOAA's coral reef ecosystem research and conservation stories.

Reef Smart consisted of three components: Reef Smart Day at Sea for policy makers, Be Reef Smart! Kid's Day, and the Reef Smart Manager and Academic Researcher Open House. Reef Smart Day at Sea was attended by key decision makers in Puerto Rico and the region, including: a representative for the Resident Commissioner of Puerto Rico, the secretary of Puerto Rico's Department of Natural and Environmental Resources, the commissioner from the U.S. Virgin Island Department of Planning and Natural Resources, as well as leadership from the U.S. Coast Guard Base in San Juan. Nearly 40 students and several teachers from Guánica and San Juan participated in Be Reef Smart.

Finally, dozens of managers and NGO representatives took part in the open house to discuss ways NOAA existing technology, data and expertise can be leveraged to support the needs of local managers and coral reef priority areas. For more details on the Reef Smart events visit <http://noaaoceanscience.wordpress.com/>



Reef Smart Kid's Day participants stop for a group photo in front of the NOAA Ship *Nancy Foster*.



Guánica manager Miguel Canals (Puerto Rico DRNA) describes how only a generation ago fishermen routinely caught larger fish in Puerto Rico than today's fishermen do. Credit: NOAA/NCCOS/CCMA



Students check out the ROV with Glenn Taylor on the main deck. Credit: NOAA/NCCOS/CCMA

## Recently Added to the ESC

### Reports

**National Oceanic and Atmospheric Administration (NOAA).** 2012. *Management Report for 82 Corals Status Review under the Endangered Species Act: Existing Regulatory Mechanisms (per Endangered Species Act § 4(a)(1)(D), 16 U.S.C. § 1533(a)(1)(D)) and Conservation Efforts (per Endangered Species Act § 4(b)(1)(A), 16 U.S.C. § 1533(b)(1)(A)) March 2012 DRAFT.* This report describes existing regulatory mechanisms and ongoing conservation efforts to manage and conserve the 82 coral species of coral from the Caribbean and Pacific that are candidates for listing under the Endangered Species Act (ESA). All public submission of additional information or comments should be submitted by July 31, 2102. Information on how to submit information is available on the web at [http://www.nmfs.noaa.gov/stories/2012/04/4\\_13\\_12corals\\_petition.html](http://www.nmfs.noaa.gov/stories/2012/04/4_13_12corals_petition.html). ESC Folder: Reading Room. (Contact: [NMFS.82Corals@noaa.gov](mailto:NMFS.82Corals@noaa.gov)).

**National Oceanic and Atmospheric Administration (NOAA).** 2012. *Status Review Report of 82 Candidate Coral Species Petitioned Under the U.S. Endangered Species Act.* This report describes the status of 82 candidate coral species and evaluates extinction risk for each of them. The report evaluates extinction risk as the likelihood of a species status falling below a Critical Risk Threshold by the year 2100. All public submission of additional information or comments should be submitted by July 31, 2102. Information on how to submit information is available on the web at [http://www.nmfs.noaa.gov/stories/2012/04/4\\_13\\_12corals\\_petition.html](http://www.nmfs.noaa.gov/stories/2012/04/4_13_12corals_petition.html). ESC Folder: Reading Room. (Contact: [NMFS.82Corals@noaa.gov](mailto:NMFS.82Corals@noaa.gov)).

**Ortiz Sotomayor A, Delgado Lopez D and Ramos Álvarez A.** 2011. *Puerto Rico Local Action Strategy (LAS) for Coral Reef Conservation 2011-2015.* This report presents the Puerto Rico Local Action Strategies for 2011-2015. Local Action Strategies (LAS) are a U.S. Coral Reef Task Force led initiative to identify and implement priority actions needed to reduce key threats to valuable coral reef resources in each U.S. coral reef jurisdiction. The 2011 Puerto Las addresses the 4 NOAA priority topics: water quality, protection of coral reef fisheries, reduction of human impacts on land, and manage for climate change in four priority areas: Culebra, the North-East Reserves, Cabo Rojo and Guánica and its marine extensions. ESC Folder: Reading Room. (Contact: Damaris Delgado Lopez, [ddelgado@drna.gobierno.pr](mailto:ddelgado@drna.gobierno.pr)).

**U.S. Environmental Protection Agency (EPA).** 2012. *National Coastal Condition Report 4.* EPA-842-R-10-003. To better address questions about national coastal condition, the EPA, the National Oceanic and Atmospheric Administration (NOAA), and the U.S. Fish and Wildlife Service (FWS) agreed to participate in a multi-agency effort to assess the condition of the nation's coastal resources. The agencies chose to assess condition using nationally consistent monitoring surveys to minimize the problems created by compiling data collected using multiple approaches. The results of these assessments are compiled periodically into a *National Coastal Condition Report* (NCCR). This series of reports contains one of the most comprehensive ecological assessments of the condition of our nation's coastal bays and estuaries. This fourth NCCR (NCCR IV) assesses the condition of the nation's estuaries and coastal embayments, including the coastal waters of the conterminous United States, Southeastern Alaska, Hawaii, American Samoa, Guam, Puerto Rico, and the U.S. Virgin Islands. This assessment is based primarily on the EPA's NCA data collected between 2003 and 2006. ESC Folder: Reading Room. (Contact: Greg Colianni, [colianni.gregory@epa.gov](mailto:colianni.gregory@epa.gov)).

**Viqueira Rios R and Meyer Comas L.** 2012. *Farm Inventory of the Lajas Valley Agricultural Reserve Guánica Lagoon and El Anegado Areas, Guánica, Puerto Rico.* This report provides an inventory of all land parcels within the Lajas Valley Agricultural Reserve that may be potentially affected with the restoration of the Guánica Lagoon and identification of land ownership for each parcel. ESC Folder: Reading Room. (Contact: Roberto Viqueira, [rviqueira@hotmail.com](mailto:rviqueira@hotmail.com)).

## Presentations

**Amador J.** 2012. *Hydrology and Hydraulics Guánica Lagoon*. Presented at the NOAA Guánica/USVI Update Meeting February 24, 2012. This presentation showed the update of Hydrologic-Hydraulic Models of the historic Guánica lagoon to incorporate recent data (1999-present) and to model events of higher frequency (2 to 50 years). They modeled 4 different water levels – current, 2.4m, 2.7m, and 3.1m. And they considered an additional secondary scenario, no water in the Rio Loco, to represent localized rain events over the Lajas Valley without the Rio Loco controlling the water levels within the lagoon. Finally they presented the next steps in the process. ESC Folder: Presentations/24 Feb 2012 NOAA Guánica/USVI Update Meeting. (Contact: Juan M. Amador-Gutierrez, [jamador@gmaeng.com](mailto:jamador@gmaeng.com)).

**Bradley P and Fisher W.** 2012. *EPA's Research in Guánica Bay Puerto Rico: A Sustainable Guánica Bay Watershed*. EPA is examining the economic, social and ecological sustainability in the Guánica Bay watershed. Components of the EPA research program include: 1) Laboratory Studies 2) Condition Assessments 3) Ecosystem Service Assessments 4) Modeling and Forecasting and 5) Decision Science and Valuation. This presentation provides a brief overview of each component. Presented at the NOAA Guánica/USVI Update Meeting February 24, 2012. ESC Folder: Presentations/24 Feb 2012 NOAA Guánica/USVI Update Meeting. (Contact: Patricia Bradley, [bradley.patricia@epa.gov](mailto:bradley.patricia@epa.gov)).

**Cabezas H.** 2012. *Application of Fisher Information to Complex Dynamic Systems*. Presentation given to the EPA Puerto Rico Sustainable Communities Research Team, March 13, 2012. This presentation provides an introduction to the Fisher Information Index, which is representative of overall system order. ESC Folder: Presentations/2012 Sustainable Communities. (Contact: Heriberto Cabezas, [cabezas.heriberto@epa.gov](mailto:cabezas.heriberto@epa.gov)).

**Diaz E.** 2012. *Climate Change Vulnerability Assessment and Adaptation Strategies*. This presentation presents an overview to Puerto Rico's efforts to assess and prepare to climate change related coastal hazards. It provides an introduction to the Puerto Rico Coastal Zone Management Program and the need risk reduction as related to coastal hazards and climate change. It presents the recently developed Puerto Rico Coastal Adaptation Project and the vulnerability assessment for three key sectors: coastal communities, critical infrastructure and coastal biodiversity. Finally it focuses on the role of municipalities in preparing for adapting to climate change. ESC Folder: Presentations. (Contact: Ernesto Diaz, [ediaz@drna.gobierno.pr](mailto:ediaz@drna.gobierno.pr)).

**Heberling M and Wu S.** 2012. *Augmented Green Net National Product (GNNP): An economic metric of sustainability*. Presentation given to the EPA Puerto Rico Sustainable Communities Research Team, April 11, 2012. This presentation provides an introduction to the Green Net National Product. ESC Folder: Presentations/2012 Sustainable Communities. (Contact: Matthew Heberling, [heberling.matt@epa.gov](mailto:heberling.matt@epa.gov)).

**Hopton M.** 2012. *Overview of the Puerto Rico Sustainability Metrics Project*. Presentation given to the EPA Puerto Rico Sustainable Communities Research Team, February 15, 2012. An interdisciplinary team is working with stakeholders and decision makers to quantify sustainability of the Commonwealth of Puerto Rico. The goal of the research is to provide a methodology to measure and monitor the prosperity and environmental quality of the system. This will be accomplished using a number of metrics to capture the basic components of the system along with indicators to address stated issues of concern. Four metrics will be used to quantify sustainability in the system; Ecological Footprint Analysis to represent human burden on the environment, Green Net National Product to represent economic welfare, Emergy Analysis to represent the flow of available energy through the system and Fisher Information to represent overall system order. These metrics provide different perspectives of sustainability and the information they provide will be examined in the context of historical and potential decision contexts. ESC Folder: Presentations/2012 Sustainable Communities. (Contact: Matt Hopton: [hopton.matthew@epa.gov](mailto:hopton.matthew@epa.gov)).

**Kurtenbach J.** 2012. *Macroinvertebrate Index Development for Puerto Rico High Gradient Streams*. Presentation given to the EPA Puerto Rico Sustainable Communities Research Team, April 25, 2012. Macroinvertebrate Integrity Index Development for Puerto Rico High Gradient Streams. This macroinvertebrate index shows potential to provide accurate determination of aquatic life use support, help develop biological criteria, and protect aquatic stream resources in Puerto Rico. ESC Folder: Presentations/2012 Sustainable Communities. (Contact: Jim Kurtenbach, [kurtenbach.james@epa.gov](mailto:kurtenbach.james@epa.gov)).

## Recently Added to the ESC, continued

**Leeworthy B.** 2012. *Economic Valuation of Puerto Rico's Coral Reef Ecosystems: Recreation-Tourism*. Presented at the NOAA Guánica/USVI Update Meeting February 24, 2012. EPA and NOAA are collaborating to complete an economic valuation (market and nonmarket) survey for tourism and recreation for Puerto Rico. This presentation provides an overview of basic concepts and an introduction to the approach that will be applied in Puerto Rico. ESC Folder: Presentations/24 Feb 2012 NOAA Guánica/USVI Update Meeting. (Contact: Bob Leeworthy, [bob.leeworthy@noaa.gov](mailto:bob.leeworthy@noaa.gov)).

**Lunetta R.** 2012. *Overview of Land Use and Coastal Resources for Puerto Rico: A Decadal Trends Analysis*. Presentation given to the EPA Puerto Rico Sustainable Communities Research Team, February 29, 2012. EPA is developing a decadal biomass change product for Puerto Rico and USVI for the 2001–2010 decadal period. A web server application is currently under development to provide a data visualization and download capability. Remote sensing derived products include continuous phenology-based landscape dynamics, annual change detection alarms, and decadal biomass change for 2001–2010. Coral reef survey data include both tabular measurement data and imagery data (video and photos) collected in 2010 and 2011 for approximately 120 sampling locations. Data sets scheduled for collection in 2012 include *in situ* remote sensing coral reef radiometric measurement data for individual coral species and additional coral reef time-series measurement data to document any changes in coral reef condition. Additionally, the quantitative annual biomass product will be added in 2013 for Puerto Rico. The web server functionality will facilitate the visualization of terrestrial dynamics and change detection products with *in situ* coral reef remote sensing and measurement data sets to examine juxtaposition relationships between watershed land-use activities and coral reef conditions. ESC Folder: Presentations/2012 Sustainable Communities. (Contact: Ross Lunetta, [lunetta.ross@epa.gov](mailto:lunetta.ross@epa.gov)).

**Ma X.** 2012. *Preliminary Emergy Analysis of Puerto Rico*. Presentation given to the EPA Puerto Rico Sustainable Communities Research Team, April 25, 2012. Overview of Emergy and how apply to Puerto Rico over 50 scale. ESC Folder: Presentations/2012 Sustainable Communities. (Contact: Cissy Ma, [ma.cissy@epa.gov](mailto:ma.cissy@epa.gov)).

**Rodriguez M.** 2012. *Guánica Bay Watershed Project*. Presented at the NOAA Guánica/USVI Update Meeting February 24, 2012. ESC Folder: Presentations/24 Feb 2012 NOAA Guánica/USVI Update Meeting. This presentation provides an update of USDA NRCS activities to control erosion in the agricultural regions of the Guánica watershed. A variety of Best management Practices (BMPs) are covered. (Contact: Mario Rodriguez, [mario.rodriguez@pr.usda.gov](mailto:mario.rodriguez@pr.usda.gov)).

**Sturm P, Viqueira Ríos R, Meyer Comas L, and Amador J.** 2012. *Implementation Efforts: Guánica Lagoon, Guánica Treatment Wetlands and other Efforts*. This presentation provided an update on status of the major management actions recommended in the Guánica Bay Watershed Management Plan. These included 1) restoration of the historic Guánica Lagoon, 2) constructing treatment wetlands at the Guánica sewage treatment plant, 3) Control of sediment transport from road sides and urban areas (construction), and 4) Investigating other sources of sewage pollution. Presented at the NOAA Guánica/USVI Update Meeting February 24, 2012. ESC Folder: Presentations/24 Feb 2012 NOAA Guánica/USVI Update Meeting. (Contact: Paul Sturm, [paul@ridgetoreefs.org](mailto:paul@ridgetoreefs.org)).

**Vance L.** 2012. *Sustainability Metric for Puerto Rico: Fisher Information*. Presentation given to the EPA Puerto Rico Sustainable Communities Research Team, April 11, 2012. This presentation gives a brief overview of Fisher Information (FI). FI is then calculated for the Puerto Rican system using 141 representative variables. Results showed that although system order for Puerto Rico gradually declined from 1971 to 2009, regime change did not occur during the study time period. Spearman rank correlation results showed that of the 3 sustainability classifications (environmental, social and economic), environmental and economic FI most strongly correlated with overall FI. ESC Folder: Presentations/2012 Sustainable Communities. (Contact: Leisha Vance, [vance.leisha@epa.gov](mailto:vance.leisha@epa.gov)).

**Viqueira Ríos R, Meyer Comas L, Sturm P, and Amador J.** 2012. *Guánica Bay Watershed Restoration Project, Puerto Rico*. This presentation provided an overview of two projects related to the historic Guánica Lagoon. First, an overview of the recently completed inventory of farms in the Lajas Valley Agricultural Reserve Guánica Lagoon and el Anegado Areas. Second, a soil salinity study and groundwater determination of the Lajas Valley Agricultural Reserve. Presented at the NOAA Guánica/USVI Update Meeting February 24, 2012. ESC Folder: Presentations/24 Feb 2012 NOAA Guánica/USVI Update Meeting. (Contact: Roberto Viqueira, [rviqueira@hotmail.com](mailto:rviqueira@hotmail.com)).

**Whitall D and Bauer L.** 2012. *Baseline assessment of biological resources and LBSP stressors*. Presented at the NOAA Guánica/USVI Update Meeting February 24, 2012. This presentation provided an update of NOAA's baseline assessment of biological resources (e.g. fish, corals), chemical contaminants, nutrients and sedimentation rates, including preliminary findings. ESC Folder: Presentations/24 Feb 2012 NOAA Guánica/USVI Update Meeting. (Contact: Dave Whitall, [dave.whitall@noaa.gov](mailto:dave.whitall@noaa.gov)).

**Wu S and Heberling M.** 2012. *The Distribution of Pollution and Environmental Justice in Puerto Rico*. Presentation given to the EPA Puerto Rico Sustainable Communities Research Team, February 29, 2012. This research quantifies the distribution of toxic releases in Puerto Rico to determine if environmental inequality exists. The scientists calculate an environmental Gini coefficient using Toxics Release Inventory (TRI) data from 2000-2008. Our findings suggest Puerto Rico has a relatively constant and unequal distribution of releases over this time period. Based on this result, they investigate linkages between toxic releases and several socioeconomic and demographic indicators. They employ quantile regression using TRI data and American Community Survey data from 2005-2008 to identify important indicators across the distribution of releases. They find proximity to releases to be directly related to the percent of the population which is Asian and non-Puerto Rican Hispanic, poverty and unemployment, and indirectly related to education, age, and car ownership. They also investigate the role of income indicators in affecting pollution levels, but only find a few significant links. ESC Folder: Presentations/2012 Sustainable Communities. (Contact: Shanshan Wu, [wu.shanshan@epa.gov](mailto:wu.shanshan@epa.gov)).

**Yoshioka B and Padrón S.** 2012. *Guánica Bay Habitat Restoration Initiative Upper Watershed*. Presented at the NOAA Guánica/USVI Update Meeting February 24, 2012. This presentation provides an overview of the benefits provided by the conversion from sub-grown to shade grown coffee, including providing habitat for birds, amphibians and reptiles and reducing soil erosion on farms. Also presented is the coffee model: 30% shade, multiple native species, and a diamond gridded planting layout. To date, they have planted 667 acres, and 24,035 trees. ESC Folder: Presentations/24 Feb 2012 NOAA Guánica/USVI Update Meeting. (Contact: Beverly Yoshioka, [beverly\\_yoshioka@fws.gov](mailto:beverly_yoshioka@fws.gov)).

### Fact Sheets

**U.S. Fish & Wildlife Service (US F&WS).** *The Coastal Program in the Caribbean: Puerto Rico*. This fact sheet provides an overview of US F&WS programs in Puerto Rico. Included are a brief discussion of habitats of special concern and threats to those habitats, conservation strategies, current partners, new and ongoing projects, and geographic focus areas. ESC Folder: Reading Room/Fact Sheets. (Contact: Beverly Yoshioka, [beverly\\_yoshioka@fws.gov](mailto:beverly_yoshioka@fws.gov)).



## Southwest Puerto Rico SWCD Recognized by USDA NRCS for Leadership in Protecting Natural Resources

USDA NRCS recently recognized the Southwest Puerto Rico Soil and Water Conservation District for providing leadership in the protection of natural resources in Southwest Puerto Rico. As part of a new cooperative conservation partnership between NRCS and the Southwest Soil and Water Conservation District (SWCD), Southwest SWCD is providing engineering and administrative services to manage construction of water conservation and runoff management practices or systems in the Rio Loco/ Guánica watershed.

Engineering practices to conserve water and manage runoff include, but are not limited to, sediment and water control basins, stream bank and shoreline protection, grassed waterways, open channels, irrigation water reservoirs, irrigation systems, irrigation water conveyances and pumping plants. The expected benefits from installing these conservation systems include: reducing contaminant loads to coastal waters, reducing soil erosion and sediment deposition, improving the filtering capacity of riparian areas, improving irrigation systems, improving water quantity and quality of the aquifer, and reducing water and energy consumption.

The project is focused on the Rio Loco/Guánica watershed as part of multi-agency efforts to improve upland water quality to reduce pollution impacts to the Guánica Bay, the coastal waters of southwest Puerto Rico, and associated coral reefs.

For more information, please contact José Castro, [Jose.Castro@pr.usda.gov](mailto:Jose.Castro@pr.usda.gov)



Front L-R: Mara Semidei, SWCD At-Large Member; Isela Ortiz, SWCD Administrator;  
Back L-R: Carlos Gonzalez, SWCD Treasurer; Pedro Ramirez, SWCD Supervisor; Jose B Ramirez, SWCD Secretary; Edwin Almodovar, NRCS Caribbean Director; Jaime Acevedo, SWCD Chair; Michael McGee, SWCD Supervisor.



Stream bank damages in the Rio Loco/ Guánica watershed to be alleviated through the NRCS & SWCD partnership.

Submit updates to:

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